

## On Wattles and Wattle-bark.

*Alfred J. Ewart, D.Sc., Ph.D., Professor of Botany and Plant  
Physiology in the Melbourne University.*

The efforts of the Field Naturalists' Club and of the Wattle League have recently drawn considerable attention to our native wattles as plants of sufficient beauty to be regarded as the national flower of Victoria or of Australia, and also as being possessed of sufficient economic value to be worthy of cultivation and to be protected from destruction when growing wild. In regard to the question of the wattle as the national flower for Australia, several points of interest may be noted. In the first place, the name "wattle" is an instance of one of those misnomers, or at least words with altered meanings, which are so common in Australia. The word "wattle" is usually applied to the fleshy appendages hanging from the heads of such birds as fowls, and hence the Australian wattle bird receives its name, not from any association with the plants, but from the fleshy appendages which hang from its ears. The name wattle applied to acacias is derived from the Anglo-Saxon word "wutel," meaning a hurdle, and hence came to be applied to the osier, *Salix viminalis*, one of the common European willows from whose flexible twigs hurdles were usually woven. The early colonists in New South Wales, using the branches of acacia for similar purposes and for stiffening the mud walls of their huts, applied to these acacias the name of wattle, which has since persisted and passed into general popular use. Strictly speaking, the name wattle should not be used as a general term for all acacias, but only to a certain limited number of species, and it would not be correct to apply it to acacias which grow outside Australia.

With regard to the wattle as the Australian national flower, this is of course entirely a matter for public opinion, and in time the latter is bound to crystallize around some particular plant. The wattle has much in its favour as regards beauty and fragrance as a national floral emblem. From a botanical stand-point, however, the acacias are not nearly as typically Australian as certain other genera, notably eucalyptus. Out of a total of 296 species of eucalyptus, only 25 occur elsewhere, and of these few species all are natives of districts not widely separated from Australia. On the other hand, out of a total of 767 species of acacia known to science, some 417 species are Australian, 112 species are native to Africa, and 234 species grow in other countries.

Hence there would be no valid cause of objection if any other country—South Africa, for instance—were also to adopt the wattle as its national flower; and although the eucalyptus is peculiarly

Australian, it now grows in such abundance in many parts of the world as to form a characteristic feature of the forest flora, and to give rise to the possibility of its being adopted as a national flower for certain of the States in North America, or for some of the smaller Principalities in Europe, not as yet provided with a national floral emblem. As a matter of fact, botanical considerations usually play little part in the adoption of national flowers. There is, for instance, no special botanical reason why the rose should be the national flower for England, or the lily the national flower of France; while in the case of Scotland, the national flower a botanist would have selected would probably have been the heather.

In our own case, the special merit of the wattle probably lies in the fact that so many species flower at the same time, early in spring, forming a conspicuous feature in the landscape and giving the first relief from winter's floral monotony. Regarding the fears that have been expressed that the popularization of the wattle—if it needs any popularizing—and its adoption as the national flower may lead to its destruction, this is not a very serious danger. The adoption of the thistle as the national flower of Scotland has, for instance, not caused this plant to become extinct, nor have roses or lilies suffered in any way through being national flowers. Wattles in particular are easily planted and quickly grown, and are able to re-establish themselves year after year on ground where they have once grown, provided the conditions are suitable. It is probably no exaggeration to say that there are sufficient dormant wattle seeds lying in the surface soil of Victoria to cover the whole of Australia with a dense crop of wattles, if planted out and given the conditions necessary for development. The only damage done to wattles by people removing blossoms is when large branches are broken off, spoiling the symmetry of the tree and leaving a ragged injury aiding the penetration of borers or starting decay. Small, slender flowering branches may be cut or broken off without injuring the tree in the least; and, in fact, pruning off all the flowering branches each season would increase the life of the tree and give it a more compact growth. Most wattles can, in fact, be pruned much more severely than is generally imagined without suffering or being permanently injured, and in gardens a little judicious pruning will often considerably improve the appearance of various acacias, particularly when individual branches show signs of disease.

#### WATTLES FOR GARDENS AND PARKS.

Although wattles or acacias in general are well suited for garden cultivation, they are not suitable plants for street planting, particularly in large towns. For the most part they are very apt to become begrimed and dingy in appearance in an atmosphere which is at all smoky. In addition, the duration of life is short and also irregular. The best selected and tended avenue of acacias could rarely be relied upon for more than ten years, and after that time would need continual replanting as single trees died, so that the symmetry would always be broken by a series of gaps. Apart from the attacks of the borer beetle, the acacias in general are liable to the attacks of various

plant and animal parasites, which may injure the trees or may completely distort its natural appearance. The natural habitat of most of our common acacias is on the fringes of forests, in open forest glades, and generally among other trees wherever a sufficient opening occurs. They do best, in fact, when given a certain amount of protection by other vegetation. This applies particularly to the species with tender leaflets and to a somewhat lesser extent to those with large flat phyllodes. The species with prickly or needle-like leaves, on the other hand, stand exposure much better, but have no special decorative or economic value for the most part.

Many of our Australian acacias are very suitable plants for cultivation in gardens and parks. A list of these was compiled by Mr. F. Pitcher, of the Botanic Gardens, and issued as a leaflet by the Wattle League. With a few slight alterations the list in question is given beneath, and though it does not entirely exhaust all the acacias which may be worthy of cultivation, it is sufficiently comprehensive for ordinary purposes.

*Acacia acinacea*, "Gold Dust Acacia." Approximate height, 5-8 feet. Victoria, New South Wales, and South Australia.

„ *armata*, "Hedge Acacia." 10-15 feet. Western Australia, South Australia, Victoria, New South Wales, and Queensland.

„ *Baileyana*, "Cootamundra Wattle." 10-15 feet. New South Wales.

„ *brachybotrya*, "Silvery Acacia." 4-8 feet. Victoria, New South Wales, and South Australia.

„ *buxifolia*, "Box Acacia." 3-5 feet. New South Wales and Queensland.

„ *cardiophylla*, "Wyalong Wattle." 8-10 feet. New South Wales.

„ *cultriformis*, "Knife-leaved Wattle." 8-15 feet. New South Wales and Queensland.

„ *cyanophylla*, "Blue-leaved Wattle." 12-20 feet. Western Australia.

„ *dealbata*, "Silver Wattle." 80-100 feet. Victoria, New South Wales, Queensland, South Australia, and Tasmania.

„ *decurrens*, "Early Black Wattle," or "Green Wattle." 10-20 feet. New South Wales, Victoria, and Queensland.

„ *diffusa*, "Spreading Acacia." 3-5 feet. Victoria, New South Wales, and Tasmania.

„ *discolor*, "Sunshine Wattle." 10-20 feet. Victoria, New South Wales, and Tasmania.

„ *elata*, "Cedar Acacia," or "New Year Wattle." 60-80 feet. New South Wales.

„ *homalophylla*, "Yarram Acacia." 15-40 feet. Victoria, New South Wales, Queensland, and South Australia.

„ *implexa*, "Lightwood Acacia." 30 feet. Victoria, New South Wales, and Queensland.

- Acacia iteaphylla*, "South Australian Wattle." 8-12 feet. South Australia.
- „ *Jonesii*, "Jones Acacia." 5 feet. New South Wales.
- „ *juniperina*, "Juniper Acacia." 8-10 feet. Victoria, New South Wales, Queensland, and Tasmania.
- „ *leprosa*, "Leper Acacia." 15-30 feet. Victoria and New South Wales.
- „ *leprosa* var. *elongata*, "Seville Wattle." 10-20 feet. Victoria.
- „ *linearis*, "Narrow-leaved Acacia." 5-8 feet. Victoria, New South Wales, Queensland, and Tasmania.
- „ *lincifolia*, "Flax Acacia." 8-12 feet. Victoria, New South Wales, and Queensland.
- „ *longifolia*, "Sallow Acacia." 15-30 feet. Victoria, New South Wales, Queensland, South Australia, and Tasmania.
- „ *longifolia*, var. *floribunda*, "Marrai-us," or "Many-flowered Acacia." 8-12 feet. Victoria and New South Wales.
- „ *longifolia* var. *Sophorae*, "Coast Acacia." 3-8 feet. Victoria, New South Wales, Queensland, South Australia, and Tasmania.
- „ *lunata*, "Crescent Acacia." 3-5 feet. Victoria, New South Wales, and Queensland.
- „ *Macradenia*, "Mackay (Myall) Wattle." 10-12 feet. Queensland.
- „ *Maidenii*, "Maiden Acacia." 50 feet. New South Wales and Queensland.
- „ *melanoxydon*, "Blackwood Acacia." 40-100 feet. Victoria, New South Wales, South Australia, and Tasmania.
- „ *Mitchelli*, "Fringe Wattle." 2-6 feet. Victoria and South Australia.
- „ *mollissima*, "Late Black Wattle." 30-100 feet. Victoria, New South Wales, South Australia, and Tasmania.
- „ *montana*, "Mountain Acacia." 4-6 feet. Victoria, New South Wales, and South Australia.
- „ *myrtifolia*, "Myrtle Acacia." 5-8 feet. Victoria, New South Wales, Queensland, South Australia, Western Australia, and Tasmania.
- „ *oxycedrus*, "Spike Acacia." 3-10 feet. Victoria, New South Wales, South Australia, and Tasmania.
- „ *pendula*, "Weeping Myall," or "Boree." 30-40 feet. New South Wales and Queensland.
- „ *penninervis*, "Hickory Wattle." 30-40 feet. Victoria, New South Wales, Queensland, and Tasmania.
- „ *podalyrifolia*, "Queensland Silver Wattle." 10-15 feet. New South Wales and Queensland.
- „ *pravissima*, "Ovens Acacia." 10-20 feet. Victoria and New South Wales.

|                                                 |             |                                                                                                 |
|-------------------------------------------------|-------------|-------------------------------------------------------------------------------------------------|
| <i>Acacia prominens</i> , “Golden-rain Acacia.” | 10-15 feet. | New South Wales.                                                                                |
| „ <i>pruinosa</i> , “Frosty Acacia.”            | 10-15 feet. | New South Wales.                                                                                |
| „ <i>pycnantha</i> , “Golden Wattle.”           | 20-40 feet. | Victoria, New South Wales, and South Australia.                                                 |
| „ <i>retinodes</i> , “Wirilda Acacia.”          | 10-20 feet. | Victoria and South Australia.                                                                   |
| „ <i>Riceana</i> , “Rice Wattle.”               | 8-10 feet.  | Tasmania.                                                                                       |
| „ <i>salicina</i> , “Willow Acacia.”            | 15-25 feet. | Western Australia, South Australia, Victoria, New South Wales, Queensland, and North Australia. |
| „ <i>saligna</i> , “Western Wattle.”            | 12-20 feet. | Western Australia.                                                                              |
| „ <i>spectabilis</i> , “Showy Acacia.”          | 8-12 feet.  | New South Wales and Queensland.                                                                 |
| „ <i>stricta</i> , “Straight-leaved Acacia.     | 2-10 feet.  | Victoria, New South Wales, and Tasmania.                                                        |
| „ <i>strigosa</i> , “Hairy Acacia.”             | 2-4 feet.   | Western Australia.                                                                              |
| „ <i>suaveolens</i> , “Sweet Acacia.”           | 6 feet.     | Victoria, New South Wales, Queensland, South Australia, and Tasmania.                           |
| „ <i>verniciflua</i> , “Varnish Acacia.”        | 5-10 feet.  | Victoria, New South Wales, South Australia, and Tasmania.                                       |
| „ <i>verticillata</i> , “Prickly Acacia.”       | 8-15 feet.  | Victoria, New South Wales, South Australia, and Tasmania.                                       |

## ECONOMIC VALUE OF ACACIAS.

Acacias have both a direct and an indirect economic value. Owing to the fact that they are plants which bear nitrogen-assimilating root tubercles, they are important agents in maintaining the nitrogenous constituents of a fertile soil, and hence making good the loss occasioned by forest fires. The hard seeds of various species of acacia are able to remain living in the soil for long periods of time. The following are a few of the longest records obtained by me for different species of acacia, whose seeds had been kept dry for the periods of time mentioned:—

|                        |    |    | Age.     |    | Germination. |
|------------------------|----|----|----------|----|--------------|
| <i>Acacia acinacea</i> | .. | .. | 51 years | .. | 4 per cent.  |
| „ <i>alata</i>         | .. | .. | 30       | .. | 4            |
| „ <i>aneura</i>        | .. | .. | 20       | .. | 56           |
| „ <i>armata</i>        | .. | .. | 51       | .. | 11           |
| „ <i>bossiaeoides</i>  | .. | .. | 57       | .. | 3            |
| „ <i>brachybotrya</i>  | .. | .. | 57       | .. | 4            |
| „ <i>calamifolia</i>   | .. | .. | 18       | .. | 80           |
| „ <i>dealbata</i>      | .. | .. | 15       | .. | 65           |
| „ <i>decurrens</i>     | .. | .. | 17       | .. | 63           |
| „ <i>diffusa</i>       | .. | .. | 59       | .. | 10           |
| „ <i>doratoxylon</i>   | .. | .. | 20       | .. | 6            |
| „ <i>elata</i>         | .. | .. | 30       | .. | 16           |
| „ <i>Farnesiana</i>    | .. | .. | 15       | .. | 5            |

|                           |    | Age. |          | Germination. |              |
|---------------------------|----|------|----------|--------------|--------------|
| <i>Acacia glaucescens</i> | .. | ..   | 20 years | ..           | 46 per cent. |
| „ <i>lanigera</i>         | .. | ..   | 20       | ..           | 20 „         |
| „ <i>leprosa</i>          | .. | ..   | 51       | ..           | 28 „         |
| „ <i>longifolia</i>       | .. | ..   | 52       | ..           | 21 „         |
| „ <i>longifolia</i>       | .. | ..   | 68       | ..           | 5 „          |
| „ <i>lunata</i>           | .. | ..   | 48       | ..           | 8 „          |
| „ <i>melanoxydon</i>      | .. | ..   | 51       | ..           | 12 „         |
| „ <i>Merralli</i>         | .. | ..   | 10       | ..           | 6 „          |
| „ <i>montana</i>          | .. | ..   | 58       | ..           | 2 „          |
| „ <i>myrtifolia</i>       | .. | ..   | 55       | ..           | 5 „          |
| „ <i>neriifolia</i>       | .. | ..   | 17       | ..           | 4 „          |
| „ <i>nervosa</i>          | .. | ..   | 30       | ..           | 4 „          |
| „ <i>Oswaldi</i>          | .. | ..   | 10       | ..           | 50 „         |
| „ <i>penninervis</i>      | .. | ..   | 67       | ..           | 3 „          |
| „ <i>pentadenia</i>       | .. | ..   | 30       | ..           | 7 „          |
| „ <i>Senegal</i>          | .. | ..   | 51       | ..           | 5 „          |
| „ <i>Simsii</i>           | .. | ..   | 31       | ..           | 15 „         |
| „ <i>suaveolens</i>       | .. | ..   | 51       | ..           | 4 „          |
| „ <i>verniciflua</i>      | .. | ..   | 41       | ..           | 4 „          |

In each sample of air-dried seeds it is the hard seeds which last longest, and in the soil it is only these hard, non-swelling seeds which can last for any length of time. In my paper on the "Longevity of Seeds," I have used the term "macrobiotic" to denote seeds of this character which are specially adapted for dispersal in time rather than in space.\*

To some extent these macrobiotic seeds are adaptations to bush fires, which were probably of common occurrence long before the advent of civilized or even uncivilized man, and must have been far more frequent than at present when the lava was flowing from the volcanoes of Victoria.

Such bush fires, after burning off the humus more or less, not only partly expose the seeds, but leave behind an alkaline ash, which the next rain falling on the warm ground aids in softening the coats of the hard seeds, and bringing about their germination. When the ash is abundant and very alkaline the seedlings may be killed, but some will always survive. In addition, slight charring of the surface of the seed makes it permeable to water without necessarily destroying the vitality of the contents. The acacias or other leguminous plants, by the aid of their root-nodules, can grow in soil from which all, or nearly all, the humus has been burnt away, and the source of nitrates hence removed. They steadily enrich the soil again, and produce the conditions for the growth of large forest trees. These, if destroyed by a devastating bush fire, may once more be replaced by the humus-forming acacias, &c., whose seeds have lain dormant in the soil during part, at least, of the growth of the forest.

I have, in fact, found acacia seeds deeply buried in the soil of gum forests, where no other signs of their presence could be seen, and where no other acacias were present within at least a mile. In

\* See "Longevity of Seeds" in Proc. Roy. Soc. Vict., 21 (N.S.) Pt. 1 1908.

addition, the following data on page 690 may be given of the number of germinable acacia seeds per 2-in. cube of soil found at various depths under old acacias growing in undisturbed primeval bush.

A square pole of such soil would in the top 18 inches, in some cases, contain sufficient germinable seed to stock several square miles of territory, so that the amount of margin allowed for accident is very great, and even a very low percentage germination would suffice to re-cover the soil with the original vegetation after the severest bush fire. The percentage germinations are high, because as soon as the seed becomes permeable in the course of time and swells, it either germinates or dies, so that in the deeper layers the only seeds found are likely to be hard macrobiotic ones. In fact, all the seeds found in the soil below the surface needed treatment with sulphuric acid to produce swelling and germination. Once they are swollen, the seeds are incapable of remaining long living in a latent condition without germinating, and this applies generally to the seeds of Leguminosæ, whether cuticularized or not.

|                        |                       |    |    | Depth. | Seeds<br>Present in<br>Eight Cubic<br>Inches. | Number<br>Germinable. | Per Cent. |
|------------------------|-----------------------|----|----|--------|-----------------------------------------------|-----------------------|-----------|
|                        |                       |    |    | in.    |                                               |                       |           |
| <i>Acacia dealbata</i> | ..                    | .. | .. | 3      | 28                                            | 26                    | 93        |
| ..                     | ..                    | .. | .. | 6      | 17                                            | 13                    | 77        |
| ..                     | ..                    | .. | .. | 9      | 16                                            | 10                    | 63        |
| ..                     | ..                    | .. | .. | 12     | 11                                            | 9                     | 82        |
| ..                     | ..                    | .. | .. | 18     | 3                                             | 3                     | 100       |
| ..                     | <i>stricta</i>        | .. | .. | 4      | 1                                             | 1                     | 100       |
| ..                     | ..                    | .. | .. | 8      | 2                                             | 2                     | 100       |
| ..                     | ..                    | .. | .. | 12     | 0                                             | 0                     | 0         |
| ..                     | <i>leprosa</i>        | .. | .. | 6      | 28                                            | 24                    | 86        |
| ..                     | ..                    | .. | .. | 12     | 15                                            | 14                    | 93        |
| ..                     | <i>melanoxylon</i>    | .. | .. | 4      | 11                                            | 10                    | 91        |
| ..                     | ..                    | .. | .. | 8      | 5                                             | 4                     | 80        |
| ..                     | ..                    | .. | .. | 12     | 2                                             | 2                     | 100       |
| ..                     | <i>longifolia</i>     | .. | .. | 6      | 2                                             | 2                     | 100       |
| ..                     | Var. <i>mucronata</i> | .. | .. | 16     | 0                                             | 0                     | 0         |
| ..                     | <i>verticillata</i>   | .. | .. | 4      | 32                                            | 26                    | 81        |
| ..                     | ..                    | .. | .. | 8      | 5                                             | 4                     | 80        |
| ..                     | ..                    | .. | .. | 12     | 4                                             | 4                     | 100       |

Hence it is not surprising to find that it has been found possible to establish a breakwind of acacias on land where they had previously grown by merely fencing off a broad strip of land, letting a fire run over the surface and then ploughing. Sufficient seed was present in the surface soil to germinate under this treatment and establish a good wind-break of acacias without any planting or seeding being necessary. It will, of course, only succeed on ground where acacias were formerly abundant, and the interval of time since acacias were originally present must not be too great, probably not much more than fifty years or so.

On new ground, acacias can only be established either by planting or sowing seed. Every sample of acacia seed will contain a variable percentage of hard seed according to the conditions under which the seed ripens, and occasionally all, or nearly all, the seed in a particular sample may be hard. This hardness is due to the impregnation of the outer skin, either the cuticle or also part of the epidermal layers, with a waxy substance, making the seed impermeable to water. If a little nick is made in the skin with a file, water enters the seed at this point, making it begin to swell and separating the particles in the wax layer, so that the whole seed is able to absorb water and swell. The same effect may be produced by soaking the seeds in concentrated sulphuric acid for one to six hours until the waxy layer is eaten away, and then washing them well with water and lime water to remove or neutralize any traces of acid adhering to the skin. This method needs some care in its application, since the seeds must not remain either too long or too short a time in the acid, and this is best determined by a previous trial of a small sample. It is in all cases, however, best to test the seed by soaking in water a few of the seeds for a couple of days or so, and noting how many swell and how many become hard. If only 10 per cent. or so of the seeds remain hard, it is not worth while treating the bulk at all, but if only a minority of the seeds swell after two to three days in water, then unless the hard seeds are softened there will be great waste, since it is usually the hard seeds which give the best percentage germination when softened.

The simplest method of softening the seed is to drop them into water which has just boiled, and then allow them to remain in the water until it is cold. Seeds treated in this way should be planted at once, whereas those treated with sulphuric acid or filed can be kept dry for a considerable length of time. Filing the seeds, however, is, of course, only possible where small quantities are used.

Sowing seeds broadcast on ploughed or burnt land involves a considerable waste of seed, and is not always satisfactory in its results. Planting seedlings or individual seeds appears at first a more expensive and troublesome way of establishing a plantation, but is in the long run more satisfactory in its results, and enables the plants to be spaced out the proper distance apart without any subsequent thinning being necessary. If, however, the seedlings are grown in masses in trays, they are apt to suffer when planted owing to the disturbance of their roots. On the other hand, growing singly in pots in the ordinary way means considerable expense. For raising seedling trees on a large scale, the Forests Department uses a very cheap, ingenious, and indestructible pot. This consists of a strip of thin metal (tin, zinc, or galvanized iron may be used) something like an ordinary collar, but shorter and broader, and with the free ends bent over, one inwards and one outwards, so as to form an interlocking flange. When bent round and the flange interlocked, it forms a flower pot with sloping sides but no bottom. As it stands on a slab no bottom is necessary, and by the time the seedlings are large enough to plant out the roots have bound the soil in the pot together. When planting, a little lateral pressure unlocks the flanges, the strip of metal unrolls,

and the roots, with the soil around them, can be planted with a minimum of disturbance. Another method is to raise seedlings in short lengths of bamboos filled with soil, simply splitting the bamboo and planting the whole in the soil when the seedling is old enough. The tubes should be 4 to 6 inches long, and hollow throughout. If the tube is already soft it need not be split before planting. Where preferred, however, plantations may be established by broadcasting the seed. In the case of the "Golden Wattle, *Acacia pycnantha*, Mr. Gill recommends ploughing to a depth of 6 inches or so, and broadcasting about half a pound of seed to a quarter of a bushel of sand, subsequently covering the seed to a depth of about an inch by using a light harrow if the land is rough, or a brush harrow if sandy. The sowing of the seed may take place during autumn or winter in light, well-drained soils; but in heavy, wet, cold land it is best to delay sowing until spring-time. Frequently, in thin or patchy forest land, the patches may be filled up with acacias by burning away the undergrowth and putting in seeds at distances of 8 or 10 feet. Mr. Gill states that, according to some, the best wattle-bark is usually obtained from wattles grown under the shelter of larger trees; but it is, of course, more difficult to protect such plantations from fire, cattle, and bark-strippers.

---

## II.—WATTLE-BARKS.

In the Bulletin of the Imperial Institute, much interesting information has been recently given in regard to wattle-barks, and as this information, which supplements that given by Baron von Mueller in the "Select Plants," and by Mr. Maiden in his article on "Wattles and Wattle-barks," may not be accessible to the ordinary reader, a summary of it is given.

Analyses are given of wattle-barks grown in different countries, for, as is well known, the cultivation of wattles for wattle-bark has not only been taken up with eagerness in South Africa, but also in other countries. For instance, Black, Green, and Golden Wattles, yielding respectively 40, 22, and 30 per cent. of tannin, are recommended for cultivation in Sicily; and at Palermo, *Acacia penninervis* (45 per cent. of tannin), *Acacia saligna* (30 per cent. of tannin), and *Acacia melanoxylon* (20 per cent. of tannin), have already been grown with success. In addition, in German East Africa, *A. mollissima* and

*A. decurrens* have been grown now for more than six years, and the bark was found to yield 44 per cent. and 38 per cent. of tannin respectively. The seed yielded by these wattles was found to be of first rate quality, and is being exclusively used for propagation in German East Africa.

The following data are given (*Bulletin of the Imperial Institute*, 1910, p. 246) of samples of wattle-barks from the Transvaal:—

| Botanical Source.        | Age of Tree. | Commercial Description.                                     | Percentage of Tannin. | Character of Leather.                       | Estimated Value per Ton. |
|--------------------------|--------------|-------------------------------------------------------------|-----------------------|---------------------------------------------|--------------------------|
|                          | Years.       |                                                             |                       |                                             | £ s. d.                  |
| <i>Acacia mollissima</i> | 14           | “ Sound, clean, bright bark ”                               | 42·1                  | Dull colour, good texture                   | 9 0 0                    |
| „ „                      | 18           | Well-grown, stout bark, with old, seasoned, and burnt scale | 26·7                  | Rather dark, good texture                   | 6 10 0                   |
| „ „                      | 8            | Well grown, rather rough, hard mixed                        | 41·5                  | Light colour, good texture                  | 7 10 0                   |
| „ „                      | 26           | Old, burnt bark of doubtful colour                          | 24·8                  | Dark-reddish and harsh                      | 5 0 0                    |
| „ „                      | 8            | Small and bough bark, resembling Natal ordinary             | 38·6                  | Rather dull and somewhat harsh              | 7 5 0                    |
| „ „                      | 10           | Partly burnt and wasteful                                   | 39·2                  | Light, but dull in colour, and rather harsh | 6 15 0<br>to             |
| „ „                      | 12           | Partly burnt and wasteful                                   | 37·5                  | Good colour, rather soft                    | 7 0 0<br>to              |
| „ „                      | 9            | Small and bough bark, resembling Natal ordinary             | 36·7                  | Good colour and texture                     | 7 5 0                    |
| „ „ (?)                  | 3            | Somewhat resembles Cape Bark                                | 27·9                  | Good colour, rather soft                    | 5 10 0                   |
| „ <i>decurrens</i> ..    | 6            | Short, thin, twig bark                                      | 24·4                  | Pale colour, soft, and rather spongy        | 5 10 0                   |

#### WATTLE-BARKS FROM GERMAN EAST AFRICA.

|                                  | Percentage of Tannin. | Commercial Description. | Value per Ton. |
|----------------------------------|-----------------------|-------------------------|----------------|
|                                  |                       |                         | £ s. d.        |
| <i>Acacia mollissima</i> .. .. . | 40·1                  | Badly dried             | 8 0 0          |
| „ <i>decurrens</i> .. .. .       | 32·9                  | Dark-red ..             | 7 15 0         |

SAMPLES FROM THE EAST AFRICA PROTECTORATE. (*Acacia mollissima*.)

| Age of Tree. | Commercial Description.                                            | Percentage of Tannin. | Nature of Leather Produced.                          | Estimated Value per Ton. |
|--------------|--------------------------------------------------------------------|-----------------------|------------------------------------------------------|--------------------------|
| Years.       |                                                                    |                       |                                                      | £ s. d.                  |
| 5            | Well grown, mostly of good substance, clean but rather dark inside | 38·4                  | Good colour and texture                              | 8 0 0                    |
| 4½           | Well grown, mostly of good substance, clean but rather dark inside | 43·6                  | Good colour and stiff texture                        | 8 0 0                    |
| 3½           | Stout, better colour than Nos. 1 and 2                             | 39·6                  | Good colour and stiff texture                        | 8 5 0                    |
| 3½           | Equal to best Natal ..                                             | 40·3                  | Good colour and stiff texture                        | 8 10 0<br>to             |
| 6½           | Not quite so stout or well prepared as No. 4                       | 35·8                  | Good colour and stiff texture                        | 8 15 0<br>8 10 0         |
| 10           | Smooth, pale reddish-brown fracture                                | 39·7                  | Light-pinkish leather of good texture and appearance | 8 15 0<br>to<br>9 0 0    |

## WATTLE-BARKS FROM THE CAPE OF GOOD HOPE.

|                            | Percentage of Tannin. | Character of Leather.           | Value per Ton.                                 |
|----------------------------|-----------------------|---------------------------------|------------------------------------------------|
|                            |                       |                                 | £ s. d.                                        |
| <i>Acacia pycnantha</i> .. | 40·09                 | Good .. .. .                    | } 6 10 0<br>to<br>7 10 0                       |
| „ <i>decurrens</i> ..      | 35·36                 | Good .. .. .                    |                                                |
| „ „ ..                     | 44·15                 | Good .. .. .                    |                                                |
| „ <i>saligna</i> ..        | 26·38                 | Fawn coloured, but brittle ..   | } Some local value, but of no value for export |
| „ <i>horrida</i> ..        | 18·28                 | Brown, dull surface, brittle .. |                                                |
| Mimosa Bark ..             | 18·00                 | Brown, dull surface, brittle .. |                                                |

It is evident from the above that wattle-bark can now be grown in various parts of the world, as well and as profitably as in its native home, Australia. In other words, the original monopoly has been lost; and if Australia is to regain predominance in regard to this commodity, it can only be done by the exercise of the same foresight, energy, and business qualities which have enabled other countries to become competitors in the world's market.

In three important respects, as Professor Paessler points out, wattle-barks are superior to most tanning materials. Firstly, their cost in regard to the amount of tannin available is low, and it is the more soluble tannin which is the most valuable. The less soluble portions are more difficult to extract, and produce a poorer leather. Secondly, any precipitation taking place in a tanning liquor on standing, not only hinders the tanning action on leather, but also represents the loss of a certain amount of tanning materials in the extract. In the following table Professor Paessler gives a comparison

between different tanning materials, and in the last column is included the amounts of insoluble matter deposited from tanning extracts of standard strength after standing for sixty days. As can be seen, the wattle-barks are especially satisfactory in this respect. Finally, in its power of producing a heavy leather, wattle-bark comes second only to quebracho wood.

|                     | Average<br>Cost per Ton. | Average<br>Per Cent. of<br>Tannin<br>Present. | Average<br>Cost of<br>Tannin<br>per lb. | Insoluble<br>Matter<br>Deposited in<br>60 Days. |
|---------------------|--------------------------|-----------------------------------------------|-----------------------------------------|-------------------------------------------------|
|                     | £ s. d.                  |                                               | d.                                      |                                                 |
| Oak Bark .. ..      | 5 6 8                    | 9·0                                           | 6 $\frac{1}{4}$                         | 7·5                                             |
| Oak Bark Extract .. | 12 11 2                  | 25·0                                          | 5 $\frac{1}{2}$                         | 11·5                                            |
| Valonia .. ..       | 12 11 2                  | 27·0                                          | 5 $\frac{1}{2}$                         | 29·0                                            |
| Quebracho .. ..     | 6 1 7                    | 19·0                                          | 3 $\frac{1}{2}$                         | 3·4                                             |
| Divi-Divi .. ..     | 12 3 10                  | 28·0                                          | 3 $\frac{1}{2}$                         | 29·0                                            |
| Wattle Bark .. ..   | 10 3 2                   | 33·0                                          | 3 $\frac{1}{4}$                         | 0·0                                             |
| Myrobalans .. ..    | 7 12 5                   | 30·0                                          | 2 $\frac{3}{4}$                         | 24·0                                            |
| Mangrove Bark .. .. | 7 12 5                   | 38·0                                          | 2                                       | 0·0                                             |
| Gambier .. ..       | ..                       | ..                                            | ..                                      | 0·0                                             |
| Galls .. ..         | ..                       | ..                                            | ..                                      | 16·0                                            |

#### IMPORTS AND EXPORTS OF TANNING BARK.

Some attention has recently been drawn to the fact that tanning bark derived from acacias native to Australia, but now cultivated in other countries, is being imported into Australia to make good the deficiency in the native product. In order to be able to give exact information in regard to this matter, Mr. G. H. Knibbs, the Commonwealth Statistician, has very kindly forwarded me information in regard to the exports and imports of tanning barks for 1911.

#### IMPORTS—BARK (TANNING) 1911.

| Country of Origin.            | Cwt.   | £      |
|-------------------------------|--------|--------|
| Fiji .. ..                    | 315    | 174    |
| Other South Sea Islands .. .. | 154    | 44     |
| Papua .. ..                   | 93     | 24     |
| South Africa .. ..            | 71,685 | 30,898 |
| Italy .. ..                   | 200    | 113    |
| Total .. ..                   | 72,447 | 31,253 |
| <i>Importing States.</i>      |        |        |
| New South Wales .. ..         | 54,898 | 24,031 |
| Victoria .. ..                | 10,325 | 4,349  |
| Queensland .. ..              | 59     | 29     |
| South Australia .. ..         | 6,075  | 2,361  |
| Western Australia .. ..       | 1,090  | 483    |
| Total .. ..                   | 72,447 | 31,253 |

## EXPORTS—BARK (TANNING) 1911.

| Country of Origin.         | Cwt.    | £       |
|----------------------------|---------|---------|
| New South Wales .. .. .    | 8,933   | 3,883   |
| Victoria .. .. .           | 33,370  | 14,599  |
| South Australia .. .. .    | 11,021  | 5,089   |
| Western Australia .. .. .  | 175,590 | 70,947  |
| Tasmania .. .. .           | 24,637  | 10,118  |
| Northern Territory .. .. . | 5       | 10      |
| Total .. .. .              | 253,556 | 104,646 |

Mr. Knibbs adds that: "The records do not disclose any further information as to the particular kind of bark, but I include the particulars of the country of origin, which will probably furnish some indication. During 1911 the imported bark was almost entirely from South Africa, and would probably be wattle-bark."

Included under the imports of tanning materials are such products as myrobalans, valonia, &c., which are not really competitors of wattle-bark, but are used for special purposes for which wattle-bark is not suitable. Since these materials cannot be grown locally, at least not in Victoria, to compete with the native product, importation in such cases is a necessity. It is, however, evident from the countries of origin that these form a relatively small proportion of the total imports of tanning materials; and it certainly seems absurd that a country like Australia should be apparently in the process of becoming dependent on the outside world for supplies of one of its own native products. The main reason probably is that too much reliance has been placed on the natural growth, and insufficient attention to planting and re-establishment. The following table shows clearly that, for some years past, a tendency has existed towards a decrease in the exports and an increase in the imports of tanning material, and this in spite of the fact that good prices are obtainable locally, and there is a steady and increasing demand for tanning materials:—

## IMPORTS AND EXPORTS OF TANNING BARK DURING 1906–1911.

| Particulars.                              | 1906.   | 1907.   | 1908.   | 1909.   | 1910.   | 1911.   |
|-------------------------------------------|---------|---------|---------|---------|---------|---------|
| Quantities—                               | Cwt.    | Cwt.    | Cwt.    | Cwt.    | Cwt.    | Cwt.    |
| Imports .. .. .                           | 63      | 344     | 38,711  | 28,020  | 12,648  | 72,447  |
| Exports .. .. .                           | 431,896 | 358,167 | 260,364 | 225,872 | 295,616 | 253,556 |
| Excess of Exports<br>over Imports .. .. . | 431,833 | 357,823 | 221,653 | 197,852 | 282,968 | 181,109 |

## PRACTICAL HINTS AND SUGGESTIONS.

It is evident from the foregoing that there is a deficiency in the local production of wattle-bark which should be made good by an increase of planting of suitable acacias. If, however, this is to be profitable, it must be done on practical and business lines; and there are certain pests, particularly the "Fire Blight," *Paropsis orphana*,

which have been responsible for the destruction of or serious damage to large plantations intended for the production of wattle-bark. This pest appears to be specially injurious to the Common Black Wattle, *Acacia decurrens*, and to do little or no damage to the Golden Wattle, *Acacia pycnantha*. It is possible that if in the large plantations mentioned the chessboard system of planting had been adopted, and the acacias planted in small squares surrounded by other trees, there



\* ACACIA DECURRENS (EARLY BLACK WATTLE).

would have been greater scope for checking the spread of the pest. There are, however, risks of this kind in all natural industries, and the fact that acacias have thrived and survived so well in Victoria for ages past, and have survived their numerous foes, shows that it is merely necessary to repeat the proper conditions for their growth to attain success in wattle cultivation.

The following facts and practical information were obtained from technical and reliable sources:—

“The best bark is grown towards the west of Victoria, and it becomes less valuable towards the east, *i.e.*, towards Gippsland. The least variation of value according to locality appears to be shown by the Golden Wattle wherever it is grown, so far as the available



ACACIA MOLLISSIMA (LATE BLACK WATTLE).

local data are concerned. Very good bark comes from the district within a 35-40 miles radius of Portland; and good bark, mainly from the green and black wattles, comes from the districts around the Grampians (Stawell, &c.).

The imports of wattle-bark from South Africa are increasing slightly, but this is because the local supply is not keeping pace with

the demand, or is even increasing. This, again, is largely due to the indiscriminate destruction of wattles, without any attention being paid to their replacement, either naturally or artificially. They cannot re-establish themselves when continually grazed or trampled down by stock. The occasional failure of plantations is either due to lack of attention and care, or sometimes to too much zeal in cultivation, thinning, or pruning, actually encouraging the attacks of pests.

For prime samples of wattle-bark delivered in Melbourne, from £7 10s. to £8 per ton can be obtained. This applies only to the bark from the best species (golden, black, and green wattles, *A. pycnantha*, *decurrens*, *mollissima*). Where sufficient naturally grown plants exist, the bark of the Silver Wattle (*Acacia dealbata*) is worth collecting, and is used for rough tanning. It is not, however, much used locally, is hardly worth exporting, and is certainly not worth planting in comparison with the better wattles. In all cases the best bark appears to come from trees growing naturally in mixed forests.

Trees are ready to strip when they have grown to good upstanding trees with a sufficient surface of the main trunk smooth and well grown. Usually trees six or seven years old are in this condition, and ready for stripping; but to some extent the age at which the tree is ready for stripping will depend upon the species of acacia and the district and conditions under which it is grown. Under favorable circumstances wattles grow with great rapidity. Thus a tree of *Acacia mollissima* grown in the Herbarium grounds attained a diameter at the base of 26 inches at a height of 1½ feet above ground, and a height of 25 feet in four years, and would have been quite ready for stripping in that time.

It is when acacias are approaching adult size that they seem to become especially prone to the attacks of "Woolly Blight," borers, "Fire Blight," &c., and they appear to be especially prone to the first named when growing in unnaturally exposed situations. In addition, beyond a certain age the bark appears to deteriorate both physically and chemically from an economic stand-point.

The best time to strip the bark is in spring and early summer, when the sap is rising. At that time, not only does the bark come off more easily, but it is in a better condition for tanning purposes. When stripped it should be dried in thin layers of strips laid on rough frames made of wood or branches, and raised about 1 foot above ground. The strips when fully dried and bound in bundles are ready for sale as the commercial article wattle tanning bark. They should on no account be bound in bundles or stacked until quite dry, since otherwise they become mildewed, dark coloured, and deteriorate considerably in value. Neglect of this simple precaution often causes much loss."

Mr. J. Blackburne, formerly Inspector, Forests Department, sends me some interesting information, from which I extract the following:—

"At Majorca, in 1882 and 1883, we put in a considerable area of *Acacia pycnantha*. The soil was a granite drift, very suitable for wattle culture. After ploughing and softening 1 lb. of seed per acre over night for the next day's sowing, each 1 lb. of seed was mixed with six small buckets of finely sifted soil, then sowed broadcast and brush-harrowed in. The first year after sowing they were

thinned by cutting out with heavy hoes to a distance of about 7 feet apart. In seven years the return of bark was about 5 tons per acre.

There are two well-marked varieties of *Acacia pycnantha*. One has a thin bark, reddish-brown in colour, the other a thick bark of a yellowish-brown tint. The latter is by far the best.

If the seed were drilled in 7 feet apart, two or three seeds in each hole, and the superfluous seedlings removed later, less seed would be required per acre.



ACACIA PYCNANTHA (GOLDEN WATTLE).

We also sowed at Majorca *A. decurrens* mixed with eucalypts, and they did splendidly, making clean straight stems up to 30 feet in height, easily stripped, and yielding bark of good quality with 35 to 40 per cent. of tannin. Wattles are grown naturally by this system.

*Acacia pycnantha* is rather tender, and is apt to be damaged in its young state by severe frost. If wattles alone were put in granite soil, deep, with a porous clay subsoil, I would prefer *A. decurrens*

to *A. pycnantha* (using about  $\frac{3}{4}$  lb. of seed per acre), although *A. mollissima* also does well in the Grampians in soil made by the wearing down of the sandstone ranges there. A good average rainfall is also a necessity for success. Plantations can be cheaply formed if there is plenty of *débris*, bracken fern, &c., on the ground, by sowing seed broadcast on the area chosen, and then letting a fire go through it. I would double the quantity of seed in such experiments, and cut out the surplus growth the first year after sowing."

For the following facts I am indebted to Mr. H. Mackay, Conservator of Forests:—

"The Forests Department has about 20,000 acres of natural wattle plantations, consisting chiefly of *Acacia mollissima*, "Late Black Wattle." These are mainly in the Victoria Valley, in the Grampians, also on the north side of Victoria Range, the same wattle covers areas of 4,000 acres or more.

The plantations made by the Department include in recent years about 5,000 acres, of which 2,500 are in the Kentbruck district, between Portland and Nelson, on the South Coast. These plantations consist almost wholly of *Acacia pycnantha*, which grows well, but suffers from cold in dry winters wherever the limestone is near to the surface. It has, however, the advantage of not being prone to the attacks of "Fire Blight." These plants are from five to six years old, and the first stripping will take place next year.

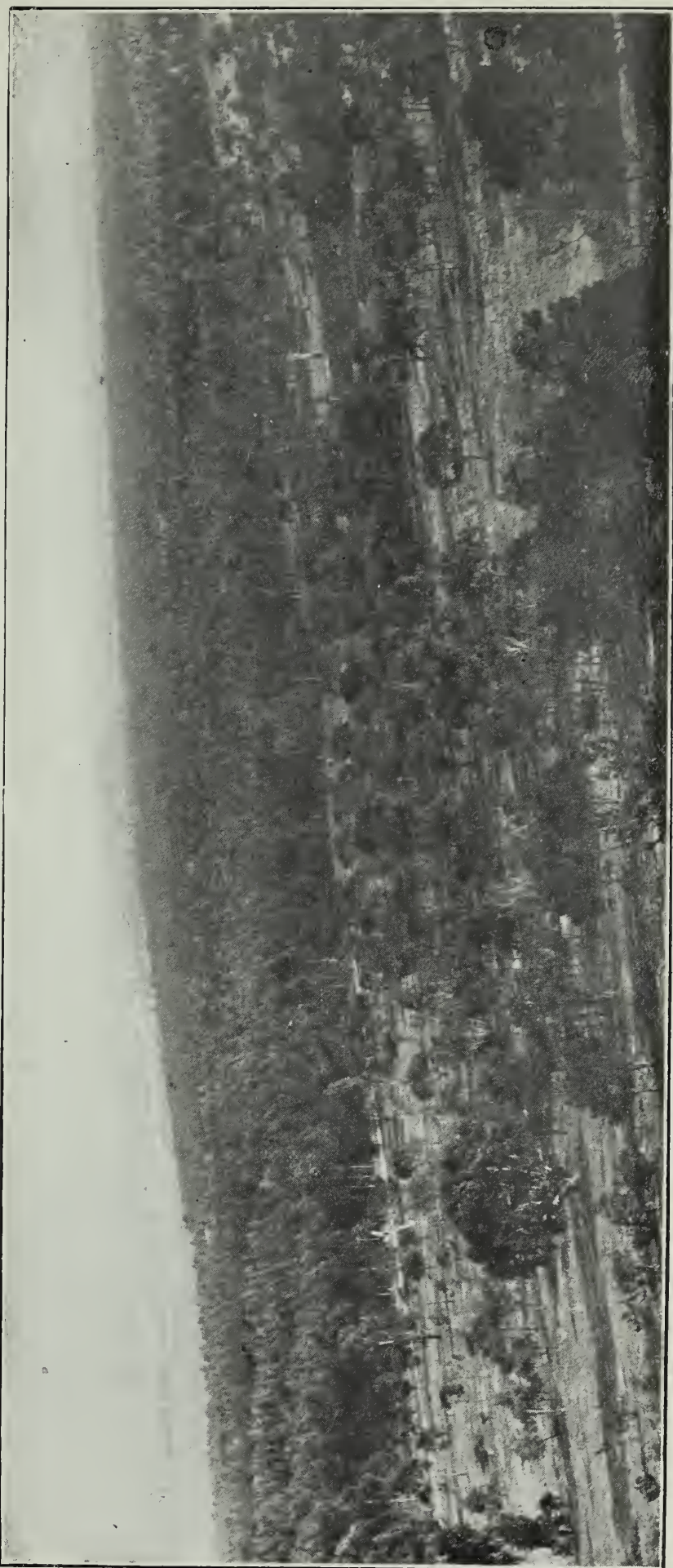
At the You Yangs, 14 miles from Geelong, is an old plantation established first in 1887 by the late Mr. Fergusson, officer in charge of the State Nursery at Macedon. Bluegum and wattle seeds were mixed and sown broadcast. This is a good method of providing a shelter belt, but if the other trees such as gums or pines are too close together, the wattles suffer. On the other hand, since the wattles are sensitive to winds and frosts, some protection is beneficial to them. In close, warm gullies, however, they are especially apt to suffer from "Fire Blight," the beetles which cause the mischief breeding especially well under moist warm conditions. For districts within 50 miles of the coast, the best wattle to plant is *A. pycnantha*, with broad, flat leaves or phyllodes, instead of the delicate foliage of the Black and Green wattles. The Golden Wattle will also grow further inland, but becomes too small in size.

The question of costs and profits depends to some extent upon freedom from disease and pests, from the ravages of fires, and upon the vicinity to markets such as Melbourne and Geelong, where large tanneries are established. In addition, the cost of hand stripping, which was formerly 30s. per ton, has now risen to £2 or £2 5s. per ton. The price of wattle-bark, which twenty-seven or thirty years ago varied from £9 to £11 per ton, now varies according to quality from £6 5s. to £7 10s. per ton. Exaggerated ideas are prevalent as to the profits to be derived from wattle plantations, and statements have been published that £10 per acre would be an average profit. Taking an average quality of poorer soils, such as granite slopes, limestone pebbles, uplands, or sandy loam, and allowing for the cost of fencing and netting to exclude sheep and rabbits for at least the first four years, the profit per acre where a plantation has been maintained successfully would be nearer £5 or £6 per acre as the results of strippings

extending from the sixth to the tenth year. Assuming a profit per sheep of 4s. to 6s. per annum by their natural increase and wool, and bearing in mind the fact that the return is quicker and the profits are obtained with less risk and greater certainty, grazing is a more profitable way of utilizing the land than wattle planting, and it will certainly not pay to convert good grazing land into wattle plantations.

In the case of the plantation at the You Yangs, fair profits are made each year; but a private owner would need to add to his profit and loss account the interest on the capital represented by the land, and on the original cost of the plantation.

In comparing the cultivation of wattles in South Africa and in Australia, it should be remembered that the former has certain advantages. Firstly, the freight to Hamburg or London is less than from Australia. Secondly, a supply of cheap black labour is available. Thirdly, in some parts of South Africa, at least, the wattles



GOVERNMENT WATTLE PLANTATION, LARA (YOU YANGS).



3 0112 072878397

appear to be ready for stripping a year sooner than in Victoria. There is no doubt, however, that there is a considerable amount of poor class land at present being put to no use, which might well be devoted to the cultivation of wattles. It is not likely that any one would attempt to grow wattles for profit on the carbonaceous sandstone of Gippsland, which afford rich pastures for dairying, or on fertile volcanic soils suitable for cultivation; but it may be as well to mention that wattles grown on such soils tend to be of a spindly nature, with a thin bark inferior for tanning purposes. As a rule, the best bark is obtained from granitic formations, while that from ironstone pebbles with a clay subsoil approaches and sometimes equals it. The bark from trees grown in sandy loam usually contains a little less tannic acid, but affords a good quality bark; and, in fact, yields the greater proportion of the supplies grown in Victoria.

The principal districts from which naturally grown bark is obtained are the Dartmoor district on the Lower Glenelg, the Avenel, Seymour, and Tallarook districts, the Briagolong and Glenmaggie districts in North Gippsland, and the Cunningham and Mitchell River districts in East Gippsland. The Gippsland bark is thinner, and not quite so good as that from the other localities."

The general trend of the facts mentioned above is to show that there is an opening for an increased growth of wattles for tanning bark in Victoria, but that there are certain risks attached to its profitable cultivation on a large scale, and that success is rewarded by reasonable but not extravagant profits. Apparently, the proper position is that it should enable land-owners to extract a profit from poor land they could not otherwise profitably utilize, and be more as a side line than as a mainstay of support. The cultivation of wattles does not appear to offer any openings to the man of small capital, to whom quick returns are essential.